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2 *[Geophysical Research Letters]*

3 Supporting Information for

4 **Wide-spread recurrence of winter sea surface temperature anomalies in the global oceans**5 P. Byju¹, D. Dommenget¹, and M. A. Alexander²6 ¹Monash University, Victoria, Australia.7 ²NOAA/ESRL, Boulder, USA

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10 **Contents of this file**

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13 Figures S1 to S6

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15 **Introduction**

16 Here, we show the potential areas of cold season SSTA recurrence (Figure S1) and atmospheric
17 forcings (Figure S2) in other reanalysis dataset. The recurrence shown here, from different
18 reanalysis data are consistent with the recurrence from GECCO2 and CMIP5 shown in the main
19 text. Figures S3 and S4 show global map of atmospheric recurrence for 18 CMIP5 models (see
20 Table 1 for details). The evolution of lag correlation of CMIP5 multi-model mean atmospheric
21 forcing anomalies aligned with winter SSTA recurrence, in the tropics and midlatitudes as in
22 Figure 3, are shown in figure S5. The statistical significance of the RE-index for atmospheric
23 forcings, assessed based on the probability distribution of the red noise process using lag-1
24 autocorrelation, is produced in Figure S6.

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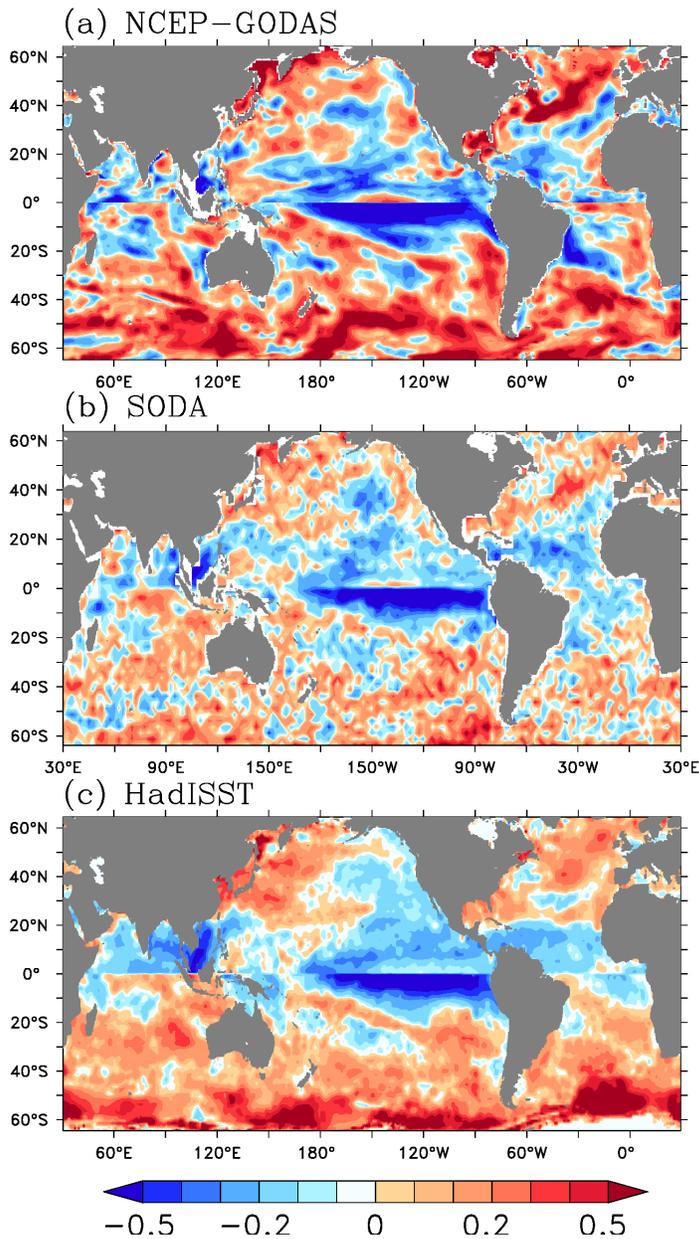
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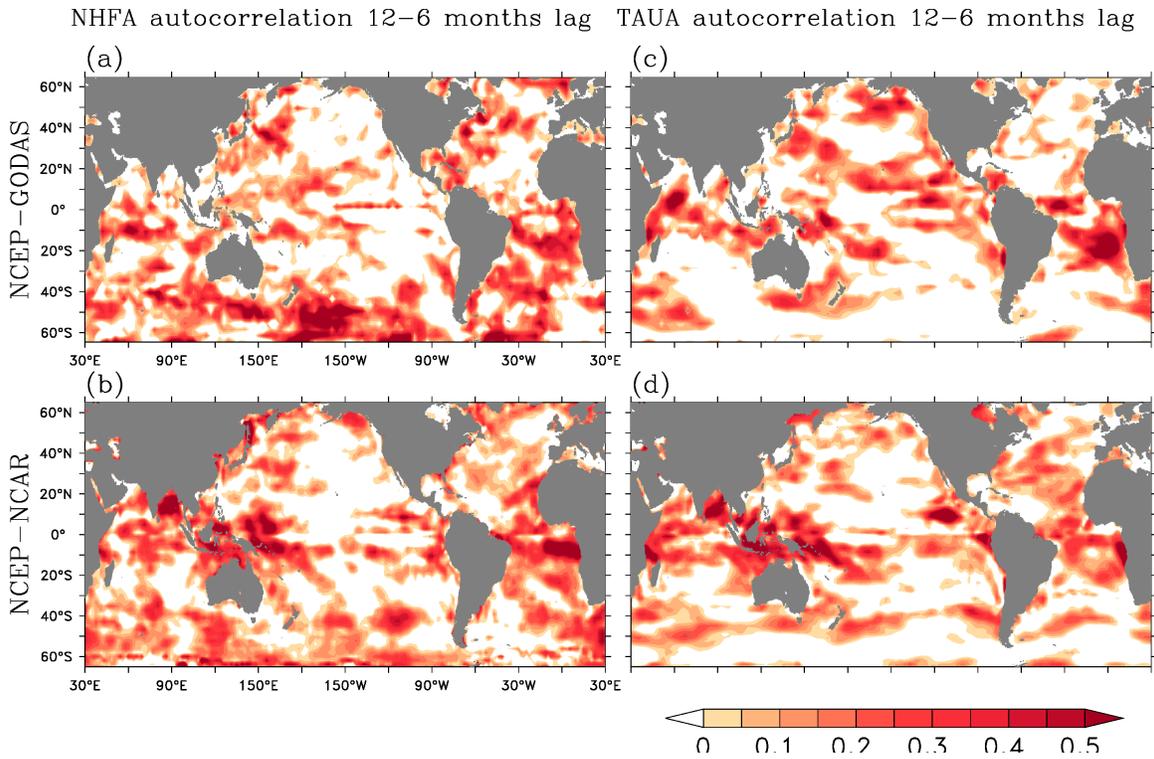
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SSTA autocorrelation 12–6 months lag



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Figure S1. Spatial map of recurrence of SSTA (RE-index) as in Fig. 2, but for (a) NCEP-GODAS from 1980-2013, (b) SODA from 1950-2010 and (c) HadISST from 1870-2011.



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Figure S2. Map showing areas of recurring (RE-index) atmospheric forcings for Net Heat Flux anomalies (NHFA) and Wind-stress anomalies (TAUA), as in Fig. 4, but a) and (c) are from the NCEP-GODAS, and (b) and (d) from the NCEP-NCAR data.



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Figure S3. Map showing areas of recurring (RE-index) atmospheric forcings for wind-stress anomalies (TAUA) from different CMIP5 models. The recurrence shown in Figure 4d is the average of all these 39 models.

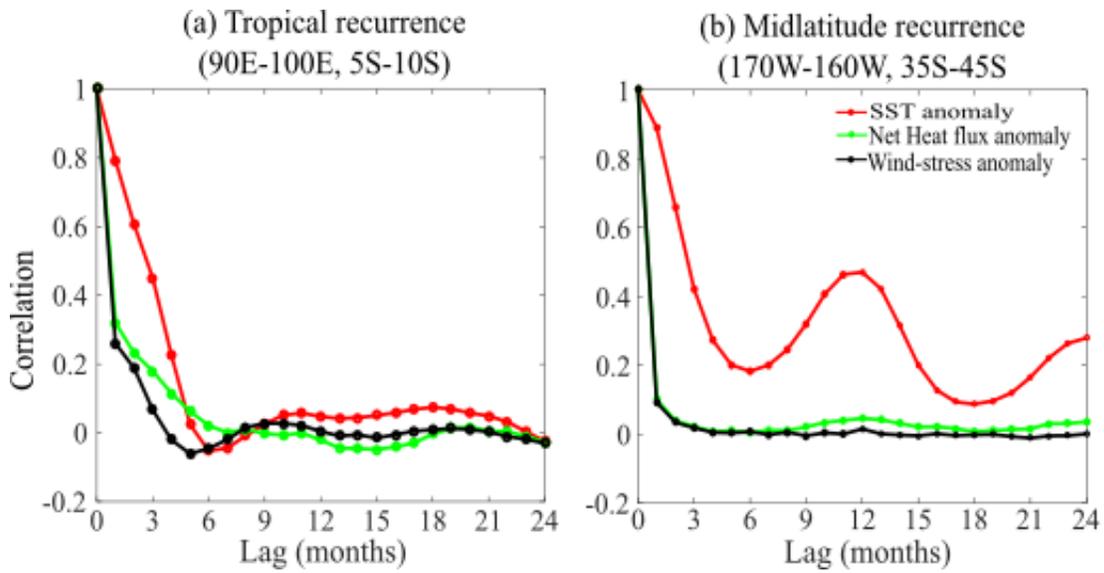
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Figure S4. Map showing areas of recurring (RE-index) atmospheric forcings for net heat flux anomalies (NHFA) from different CMIP5 models. The recurrence shown in Figure 4c is the average of all these 39 models.

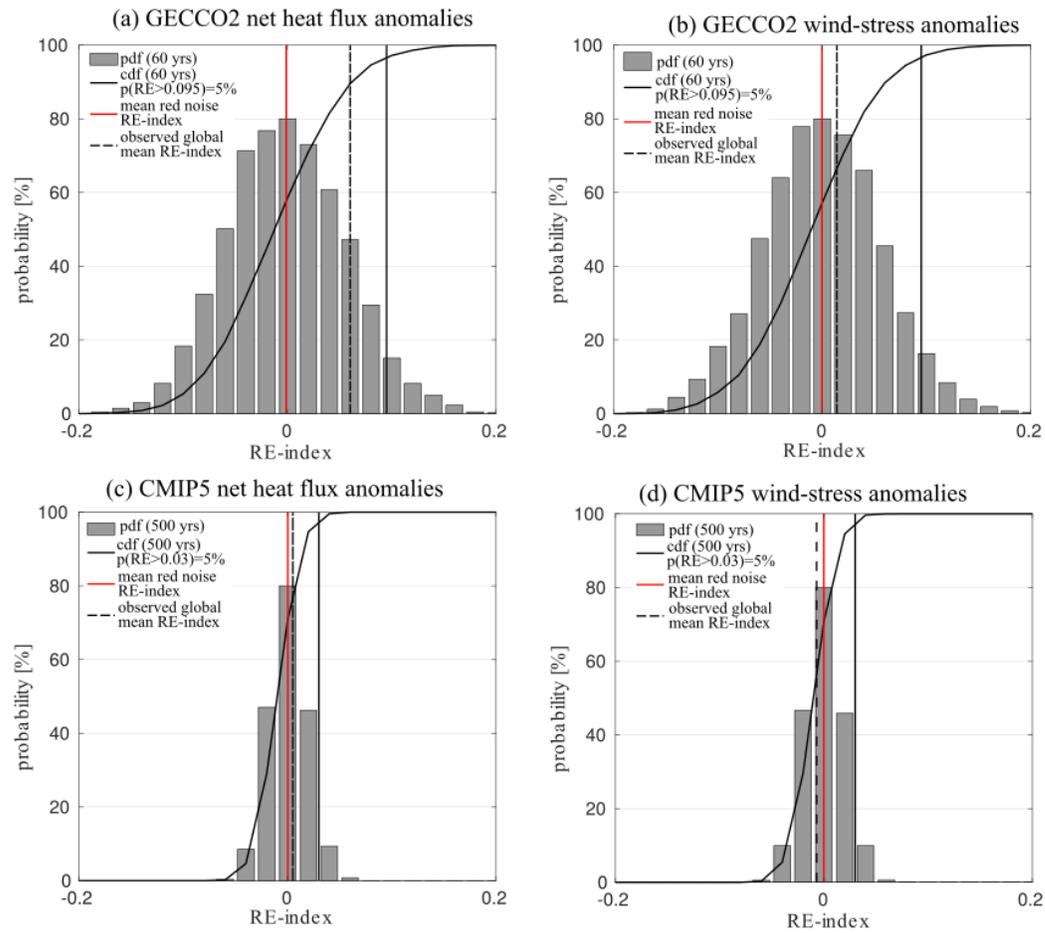
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Figure S5. Lag-correlation of winter time (here, August-September average) anomalies of temperature at surface, net heat flux and wind-stress at a location in (a) the tropics and (b) midlatitude. The analysis is based from the CMIP5 ensemble data.

RE-index distribution for red noise



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Figure S6. The probability distribution of the RE-index for a red noise process of a time series (for length see legend box) with a lag-1 auto-correlation (global average) of the corresponding variable from the corresponding dataset. The RE-index values for probability greater than 5% (95% significance) are also mentioned in the legend box.